OBSERVATIONS ON THE MORPHOLOGY AND BEHAVIOR OF THE ENICOCEPHALIDAE (HEMIPTERA)

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ABSTRACT: The morphology of the Enicocephalidae is examined and related to its behavioral implications. Sexual dimorphism and enicocephalid swarming behavior are also discussed.

DESCRIPTORS: Behavior, Enicocephalidae, morphology, sexual dimorphism, swarming.

The Enicocephalidae are small predaceous hemipterans which live in a protected habitat (i.e. under bark or in leaf litter). They are called enicocephalids or "unique-headed bugs" because the constriction behind the eyes gives the head a two-lobed appearance (Fig. 1).

Enicocephalids possess a four-segmented rostrum, four-segmented antenna, and two large ocelli on the posterior lobe of the head (Fig. 2).

They have grasping forelegs (Fig. 3), but not raptorial forelegs as for example in the Phymatinae, which have the tibia closing on the femur for grasping. The foreleg has a one-segmented tarsus with at most two large claws and four fluted spines depending on the genus. Similar spines are to be found on the apex of the tibia. The tarsal claws oppose these spines. The cleaning comb (Fig. 4) on the side of the tibia closest the body consists of long spines which are used to clean the long hairs on the antenna and the rostrum.

The middle and hind legs are also equipped with two tarsal claws and sometimes tibial spurs. There is a cleaning comb on both sides of each leg.

I have seen individuals start their cleaning ritual by using the comb on the foreleg to clean the antennae and then the rostrum. They will use the middle leg's comb to clean the forelegs, followed

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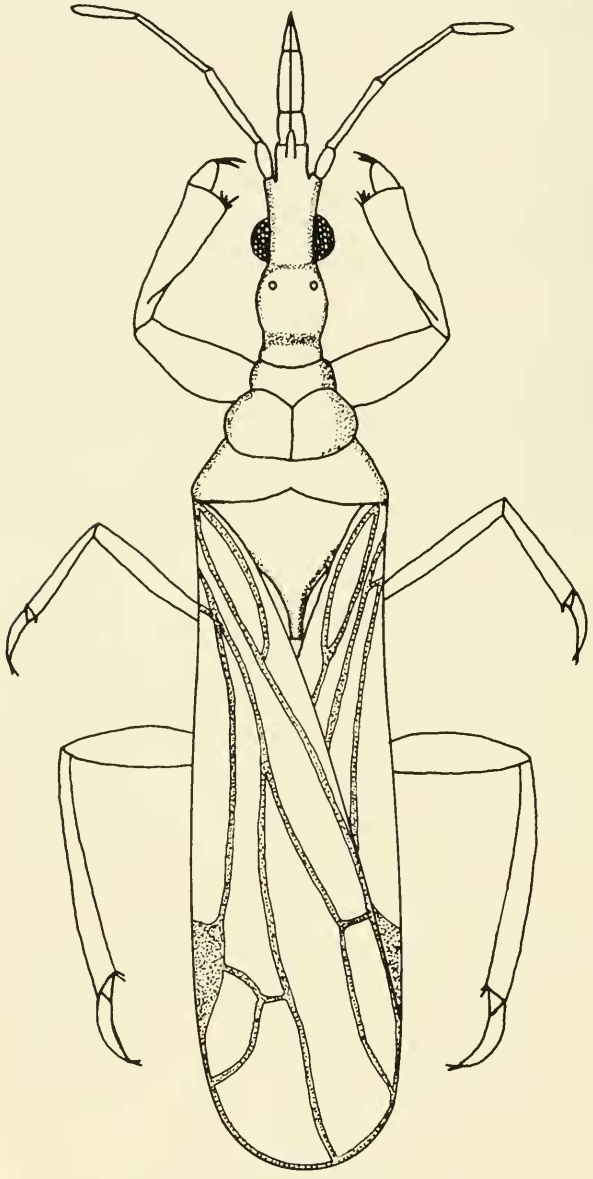


Figure 1. *Systelloderes biceps.*

Figure 2. *Systelloderes biceps* head, 90X.

by cleaning the middle legs with the hind leg's comb. The task is completed by the two hind legs cleaning each other. Because the foreleg is cleaned by the middle leg, it only needs a comb on the side of the foreleg closest to the body. However, the middle and hind legs need combs on both sides of the leg to clean all sides of the legs, this explains why there is only one comb on the inside of the foreleg, and two on the middle and hind legs.

The most observable aspect of Enicocephalidae behavior outside their protected environment is their tendency to form mating swarms. Since Emile Blanchard first recorded a swarm in 1852, there have been numerous published accounts of such events. The most recent published account was of a swarm of an undescribed species of *Systelloderes* in Costa Rica seen by Toby Schuh (1970).

The swarms are generally described as resembling a swarm of chironomids (Knab 1908; Johannsen 1909; Schuh 1970). The individuals hover between 1-4 meters off the ground and all align themselves up in the same direction with the wind. Swarms consist predominantly of males. Schuh (1970) reported 434 males and 7 females. In 1950, Dr. H.B. Mills collected 303 males and 7 females

Figure 3. *Systelloderes biceps* foreleg, 150X.

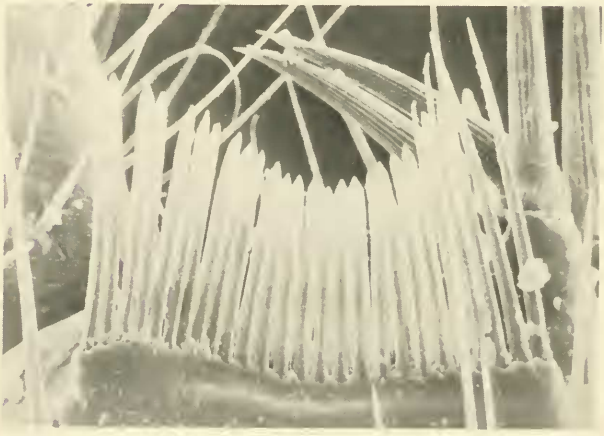
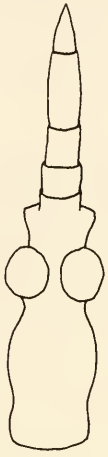


Figure 4. *Systelloderes biceps* cleaning comb, 1025X.

Figure 5. *Systelloderes biceps* male head. Figure 6. *S. biceps* female head. Figure 7. *S. biceps* male foreleg. Figure 8. *S. biceps* female foreleg. Figure 9. *S. biceps* male pronotum. Figure 10. *S. biceps* female pronotum.



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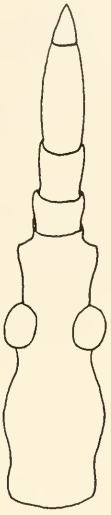

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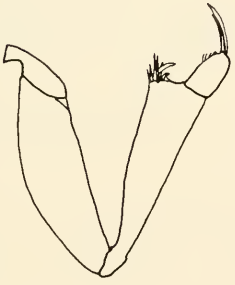

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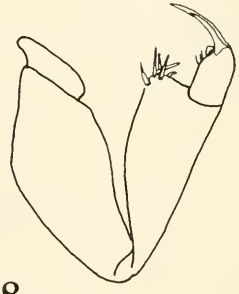

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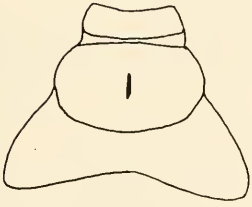

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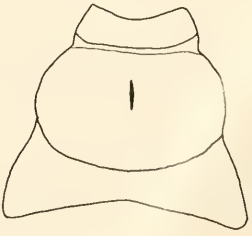

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of *S. biceps* in a swarm in Champaign, Illinois, and in 1954 Drs. E.S. Ross and E.I. Schillinger collected 90 males and 3 females of *S. longiceps* from a swarm in Peru. Similar mating swarms are known in the Diptera, Ephemeroptera, Trichoptera, and Hymenoptera (Downes 1969).

Mating swarms have adaptive advantages in that they aid the dispersal of the species as well as promote better genetic exchange. It should be noted that there is one enicocephalid genus, *Phthirocoris,* which is totally apterous and obviously doesn't swarm.

There is evidence that enicocephalid swarms are like the Diptera swarms, being station swarms. Knab (1908) writes that the swarms were "dancing in sunlight in an open space," and Ross and Schillinger (personal communication) report the swarms occurring in a "sunlit glade".

The enicocephalids are sexually dimorphic. In all species so far examined, the male has larger eyes than the female (Figs. 5 and 6).

Downes (1969), in his paper on Diptera swarming, points out that the larger male eye is used for finding the station and for spotting another individual in the swarm. The enlargement of the ventral portion of the male enicocephalid eye suggests that the male spots a station marker that is below him. The enlargement of the ocular area also suggests that the male approaches the female from the top. The actual approach of enicocephalids is unknown but the male does position himself directly on top of the female during copulation in flight (Schuh 1970).

The male also has a more slender foreleg than the female, as seen in figs. 7 and 8. A third dimorphic feature is the greater size of the middle lobe of the pronotum of the female as shown in figs. 9 and 10.

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